

# **ATTACHMENT 2**

## **FIELD SAMPLING PLAN**

### **SAMPLING AND ANALYSIS PLAN**

#### **JORGENSEN FORGE EARLY ACTION AREA**

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## TABLE OF CONTENTS

1	INTRODUCTION AND SCOPE OF DOCUMENT.....	1
2	VISUAL MONITORING.....	3
2.1	Equipment List .....	3
2.2	Visual Monitoring Procedure.....	3
2.3	Visual Monitoring Schedule.....	3
3	SURFACE WATER, SEDIMENT AND SOIL MONITORING.....	4
3.1	Sample Collection.....	4
3.1.1	Station Positioning .....	4
3.1.2	Equipment List.....	6
3.2	Surface Water Sample Collection.....	6
3.3	Surface Sediment Sample Collection.....	7
3.3.2	Processing Procedure .....	8
3.4	Subsurface Sediment Sample Collection.....	8
3.4.1	MudMole Sampling Procedure.....	8
3.4.2	Core Processing Procedure .....	10
3.5	Decontamination Procedures .....	12
3.6	Sample Identification Numbers.....	12
3.6.1	Surface Water .....	12
3.6.2	Soil and Sediment.....	13
3.6.3	Sample Collection Schedule.....	14
4	DOCUMENTATION, SAMPLE HANDLING, AND CHAIN-OF-CUSTODY.....	15
4.1	Documentation.....	15
4.1.1	Documentation Entries .....	16
4.1.2	Specific Requirements.....	16
4.2	Sample Handling Procedures.....	18
4.3	Chain-of-Custody Procedures .....	18
5	QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS.....	20
5.1	Analytical Chemistry .....	20
6	WASTE MANAGEMENT.....	21

7	REFERENCES .....	22
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### **List of Figures**

Figure 1	Removal Action Vicinity Map
Figure 2	Removal Action Boundary

### **List of Attachments**

Attachment 1	Sediment Core Collection Log
Attachment 2	Visual Observation Log
Attachment 3	Site Map Visual Monitoring Form

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## LIST OF ACRONYMS AND ABBREVIATIONS

°C	degree Celsius
AOC	Administrative Settlement Agreement and Order on Consent for Removal Action Implementation
BODR	Basis of Design Report
Boeing	The Boeing Company
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter
COC	chain-of-custody
CQAP	Construction Quality Assurance Plan
DGPS	Differential Global Positioning System
DSOA	Duwamish Sediment Other Area
EAA	Early Action Area
EMJ	Earle M. Jorgensen Company
EPA	U.S. Environmental Protection Agency
Facility	Jorgensen Forge facility
FSP	Field Sampling Plan
HASP	Health and Safety Plan
Jorgensen Forge	Jorgensen Forge Corporation
LDW	Lower Duwamish Waterway
NAD83	North American Datum 83
NTCRA	non-time critical removal action
OMMP	Operations, Monitoring, and Maintenance Plan
MLLW	mean lower low water
MOU	Memorandum of Understanding
PCB	polychlorinated biphenyl
PPE	personal protective equipment
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control

RAB	removal action boundary
RvAL	removal action level
SAP	Sampling and Analysis Plan
SOW	Statement of Work
WQMP	Water Quality Monitoring Plan

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## 1 INTRODUCTION AND SCOPE OF DOCUMENT

This Field Sampling Plan (FSP) was prepared on behalf of Earle M. Jorgensen (EMJ) and Jorgensen Forge Corporation (Jorgensen Forge) pursuant to the Administrative Settlement Agreement and Order on Consent for Removal Action Implementation (AOC) issued by the U.S. Environmental Protection Agency (EPA) Region 10 (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] Docket No. 10-2013-0032) and attached Statement of Work (SOW). This FSP is Attachment 2 to the Sampling and Analysis Plan (SAP), which is an appendix to the Basis of Design Report (BODR) Final Design submittal for the cleanup of contaminated sediments and associated bank soils in a portion of the Lower Duwamish Waterway (LDW) Superfund Site adjacent to the Jorgensen Forge facility (Facility) located in Tukwila, King County, Washington (see Figure 1 of the BODR; Jorgensen Forge Early Action Area [EAA]). The cleanup will be conducted as a non-time critical removal action (NTCRA) in accordance with EPA's selected cleanup alternative documented in the *Action Memorandum for a Non-Time Critical Removal Action at the Jorgensen Forge Early Action Area of the Lower Duwamish Waterway Superfund Site in Seattle, Washington* (EPA 2011) and detailed in the *Final Engineering Evaluation/Cost Analysis – Jorgensen Forge Facility, 8531 East Marginal Way South, Seattle, Washington* (Anchor QEA 2011). The southern portion of the Jorgensen Forge EAA is located near River Miles 3.6 to 3.7 on the east bank of the LDW, as shown on Figure 1.

The limits of the Jorgensen Forge EAA (herein referred to as the removal action boundary [RAB]) are shown on Figure 2. The RAB extends from the top of the bank at approximately +19 to +20 feet mean lower low water (MLLW; or top of the sheetpile/concrete panel on the southern portion of the Facility) to the federal navigation channel. The RAB is bounded to the north by The Boeing Company (Boeing) Plant 2 Duwamish Sediment Other Area (DSOA) and Southwest Bank Corrective Measure EAA cleanup area, as specified in the EPA-approved Memorandum of Understanding (MOU; EMJ et al. 2007). EPA identified this cleanup area as the northern portion of the Jorgensen Forge EAA.

This FSP addresses the collection of data required during the construction phase of the removal action. Data will be used for verification and documentation purposes during the construction phase of the removal action as well as for the completion of the long-term

monitoring performed in accordance with the Construction Quality Assurance Plan (CQAP; Appendix D of the BODR), Water Quality Monitoring Plan (WQMP; Appendix E to the BODR), and Operations, Monitoring, and Maintenance Plan (OMMP; Appendix F to the BODR).

The removal action consists of the following elements:

- **Sediment Dredging.** Removal of sediments exceeding the identified polychlorinated biphenyl (PCB) removal action level (RvAL; EPA 2008).
- **Sediment Backfilling.** Placement of imported clean fill material in removal areas to reach approximately the existing grade and elevation.
- **Shoreline Bank Reconfiguration.** Excavation of shoreline bank debris and sediments/soils to support greater slope stability and containment of the shoreline bank; this work is planned to be conducted in-the-dry to the extent possible based on tidal elevations encountered during completion of the removal action.

This FSP addresses the following:

- Visual monitoring of the shoreline bank and backfill areas
- Surface water and sediment sampling
- Subsurface sediment and soil sampling Decontamination procedures
- Sample identification procedures
- Sample collection schedule
- Sampling documentation, sample handling, and chain-of-custody (COC) procedures
- Quality assurance and quality control (QA/QC) requirements
- Waste management

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## **2 VISUAL MONITORING**

This section describes the visual monitoring activities as they pertain to the OMMP (Appendix F to the BODR). Visual monitoring of the backfill and reconfigured shoreline area will be conducted during the long-term monitoring period (see OMMP). The remainder of this section provides information that is consistent for all visual monitoring methods, including the equipment list, and visual monitoring procedure.

### **2.1 Equipment List**

The following general equipment will be required during sample collection and visual monitoring activities:

- Personal protective equipment (PPE), as required by the Health and Safety Plan (HASP; Attachment 1 of the SAP)
- Navigation and site maps
- Camera
- Field notebook
- Measuring tape (300 feet long)

### **2.2 Visual Monitoring Procedure**

Visual monitoring of the backfill and reconfigured shoreline area will be performed in-the-dry from land at low tide. The visual monitoring approach is described in detail in the OMMP (Appendix F to the BODR). Photographs and observation notes will be taken during each monitoring event. Areas of instability or sloughing will be documented as described in Section 4.1.2.4.

### **2.3 Visual Monitoring Schedule**

The schedule of visual monitoring events is identified in the OMMP (Appendix F to the BODR).

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### **3 SURFACE WATER, SEDIMENT AND SOIL MONITORING**

This section describes the sample collection activities as they pertain to the Construction Quality Assurance Plan (CQAP; Appendix D of the BODR) OMMP (Appendix F to the BODR) and WQMP (Appendix E to the BODR).

Surface water sampling will be conducted as described in the WQMP (Appendix E to the BODR) during the construction phase to minimize adverse impacts to water quality. Surface water chemistry grab samples will be collected using a van Dorn bottle or similar device. Water quality field parameter measurement activities are described in detail in the WQMP and are not included in this FSP.

Surface sediment sampling will be conducted to assess the condition of on-site and adjacent surface sediments prior to and immediately following construction (see the CQAP) and during the 10-year long-term monitoring period (see the OMMP). Post-dredge subsurface sediment sampling will also be conducted to document the final post-dredge surface (z layer) chemical concentrations are not significantly greater (as defined in CQAP; area weighted concentrations in the RAB are greater than 20 times the RvAL or 240 milligrams per kilogram normalized for organic carbon) than the total PCB RvAL. Finally, post-excavation bank soil sampling will be conducted to document the nature of the material beneath the shoreline backfill area.

#### **3.1 Sample Collection**

This section provides information that is consistent for all sampling methods, including station positioning and the equipment list. Additional subsections provide method-specific collection and processing procedures.

##### **3.1.1 Station Positioning**

The objective of location control is to accurately determine horizontal and vertical positioning of sampling locations. To achieve this objective, each sampling location will be referenced to known survey control points using the methods described below.

The following parameters will be documented at each sampling location, if applicable:

- Location coordinates (Washington state plane north zone, North American Datum 1983 [NAD83], international survey feet)
- Vertical elevation in feet National Geodetic Vertical Datum (MLLW, including mudline and tidal elevation above mudline)
- Actual water depth
- Distance from “construction work area” (applies to water quality monitoring only)
- Time and date
- Tidal elevation referenced to MLLW

These parameters will be measured using pre-surveyed, visual horizontal triangulation to known control points and/or landmarks on shore if necessary, a differential global positioning system (DGPS), laser range finder, and weighted tape measures.

#### *3.1.1.1 Differential Global Positioning System*

Location control will be performed with a DGPS unit onboard the sampling vessel. DGPS coordinates for each sampling location will be recorded at the time of sampling.

#### *3.1.1.2 Visual Horizontal Triangulation Methods*

Visual horizontal triangulation methods will be used as a backup method to the DGPS. This system will use pre-surveyed markers and/or established landmarks on shore. This method determines sampling locations based on horizontal distances to survey control points and/or landmarks identifiable on base maps. Locations will be identified by measuring the horizontal distance from the actual sampling location to the known control point or landmark to the nearest foot using a tape measure. Horizontal measurements can be calculated from registered base maps in order for field measurements can be translated to state plane coordinates. Buoy markers may be used to mark the sampling location.

#### *3.1.1.3 Vertical Control*

The vertical control parameters measured will be depth to sediment (mudline) and tidal elevation. The depth to sediment will be measured during each sampling event using a hand-held weighted tape (lead line). The tape will be dropped from the work platform to

the bottom, pulled taut, and read to the nearest 0.1 foot. This observation will be cross-checked against the onboard depth sounder.

Tidal readings will be taken periodically from a tide board installed on site and checked against daily tide charts for the LDW. Tidal elevations and time will be monitored and recorded before each sample is collected to the nearest 0.1 foot. Sample elevations will then be corrected to MLLW.

### **3.1.2 Equipment List**

The following general equipment will be required during sample collection procedures:

- PPE, as required by the HASP (Attachment 1 of the SAP)
- Navigation and site maps
- Camera
- Field notebook
- Aluminum decked boat equipped with outboard motor
- Calibrated rod or ruler for sediment depth measurement
- Sampling device (Van Veen grab sampler or similar device, MudMole or similar device and van Dorn or similar device)
- Weighted tape measure calibrated in 0.1-foot increments
- Decontamination supplies
- Stainless-steel sample processing equipment (e.g., bowls, spoons)

## **3.2 Surface Water Sample Collection**

Water column samples will be collected at the depth (3 feet from surface, or 4 feet from bottom) with the highest turbidity as determined by field parameter measurements. Samples will be collected from a self-propelled vessel. Water chemistry grab samples will be collected using a decontaminated van Dorn bottle or similar device and will be analyzed for dissolved metals and total PCB Aroclors. Recovered water from the appropriate depth will be transferred immediately to appropriate laboratory-provided, pre-labeled, pre-cleaned sample containers.

### **3.3 Surface Sediment Sample Collection**

Surface sediment samples from the 0- to 10-centimeter (cm) biologically active zone will be collected from a vessel for chemical testing using a Van Veen grab sampler or equivalent, in accordance with the protocol listed below.

#### **3.3.1.1 Van Veen Sampling Procedure**

The sampling vessel will be maneuvered to the target sampling location. Once the targeted area is determined to be suitable for grab sample collection, the Van Veen jaw assembly will be decontaminated.

The sampler will be deployed vertically through the water column until the river bottom is reached. The winch cable to the grab sampler will be drawn taut and vertical. The location of the cable hoist will be measured and recorded by the location control personnel. The jaw assembly will be closed to collect the sediment sample to a penetration depth of approximately 15 cm. The apparatus will be pulled upward out of the river bottom using a winch and raised to the surface.

The sediment sample will be retrieved aboard the vessel and evaluated against the following acceptability criteria:

- Grab sampler is not overfilled (i.e., sediment surface is not against the top of sampler).
- Sediment surface is relatively flat, indicating minimal disturbance or winnowing.
- Overlying water is present, indicating minimal leakage.
- Overlying water has low turbidity, indicating minimal sample disturbance.
- Desired penetration depth (i.e., 10 cm) is achieved.

Overlying water will be siphoned off and a decontaminated stainless-steel trowel or similar device will be used to collect the sediment from inside the sampler, taking care not to collect sediment in contact with the sides/surface of the sampler.

In the event that gravel, armor rock, or other debris prevents the jaw assembly from closing, the sampling station will be moved 5 feet and a subsequent grab sample collection will be attempted. In areas where armor rock has been placed as part of the shoreline bank

containment, collection of surface grab samples may not be possible. If sample collection is unsuccessful after three attempts, the station will be excluded from the analysis.

### **3.3.2 Processing Procedure**

Prior to sample collection from the grab sampler, an aliquot for sulfides analysis will be collected from the 0- to 10-cm interval and placed directly into the sample container without homogenization. Following sulfide analysis, additional sediment will be collected from the 0- to 10-cm interval and placed in a decontaminated stainless-steel mixing container and homogenized using a stainless-steel spoon or an electric drill with decontaminated stirring paddle until the sediment is of uniform color and consistency. Once homogenized, the subsamples will be placed in appropriate pre-labeled containers. Aliquots will also be collected and archived for potential future additional analyses. Samples will be submitted for laboratory analysis following appropriate handling and COC requirements. A complete description of analytes, analytical methods, target detection limits, and holding requirements can be found in Table 1 of the Quality Assurance Project Plan (QAPP; Attachment 1 to the SAP).

## **3.4 Subsurface Sediment Sample Collection**

Subsurface sediment samples from the 0- to 1-foot interval below the final dredge elevation will be collected from a vessel for chemical testing using a MudMole core sampler or equivalent, in accordance with the protocol listed below. Additional material below the sample interval may be archived to support future potential data needs.

### **3.4.1 MudMole Sampling Procedure**

The sampling vessel will be maneuvered to the target sampling location. The bottom of the coring device will be outfitted with a core catcher to maximize core recovery following penetration. The corer will use a decontaminated aluminum barrel for collecting the sediment. Core tube caps will be removed immediately prior to placement into the coring device.

The corer will be deployed by winch and sent to the river bottom, where the unit will then be energized and lowered to the target coring depth. When that depth is reached, the corer

will be turned off and returned to the surface for sample processing. During the coring operation, the penetration of the core barrel will be continuously monitored. Section 3.6 describes the field decontamination procedures for core collection.

The target penetration depth for each core is a minimum of 3 feet below the final dredge elevation. Core penetration and recovery will be assessed via internal and external sensors on the MudMole. The core will be sealed on the top to create suction and then removed from the sediment slowly and steadily to avoid agitating the sample. Divers will then transfer the core to the topside crew for processing. Care will be taken to minimize disturbance during this transfer. Once on the vessel, each core will be inspected and a physical description of the material at the mouth of the core will be entered on the core log. The location of the cable hoist will be measured and recorded by the location control personnel.

#### *3.4.1.1 Sample Acceptance Criteria*

The sediment core acceptance criteria are as follows:

- The core penetrated to (and retained material to) the target depth or refusal.
- Recovery was at least 75 percent of the length of core penetration.
- Sediment does not extend out of the top of the core tube or contact any part of the sampling apparatus at the top of the core tube.
- There are no obstructions in the cored material that might have blocked the subsequent entry of sediment into the core tube and resulted in incomplete core collection.
- There are no significant air gaps in the core tube, or evidence of significant loss of material out of the cutter head during retrieval.

If acceptance criteria are not achieved, the core will be rejected and the sample station will be moved 5 feet and a subsequent core will be attempted. If sample acceptance criteria are not met after three attempts, the location will be excluded from sample collection. Following inspection, core processing will be conducted as described in Section 3.4.2.

### **3.4.2 Core Processing Procedure**

Core tubes will be cut vertically using a circular saw or similar device, taking care not to penetrate the sediment too deeply while cutting. Each core will be described and documented on standardized core log. Core logs will include the following observations, as relevant:

- Sample recovery (recovered sediment depth relative to penetration depth) and calculated percent compaction
- Physical soil description in accordance with the Unified Soil Classification System (soil type, density, color, etc.)
- Odor (hydrogen sulfide, petroleum, etc.)
- Presence of vegetation
- Presence of man-made debris (e.g., trash)
- Depth and distinctness of geologic contacts
- Any other distinguishing characteristics or features

All cores will be processed in a stepwise fashion, as follows:

- **Photograph Core.** Field personnel will take digital photographs of the entire penetration depth of the core with measuring tape corresponding to the depth below mudline.
- **Core Logging.** Field personnel will record the description of the full length of the core sample on the core log.
- **Identify Sampling Zones.** The bottom of the dredge elevation will be identified in each core. The sample interval will be established between 0 and 1 feet below the final dredge elevation.

Following identification of sampling zones, sediment will be collected from the 0- to 1-foot interval below the final dredge elevation, placed in a decontaminated stainless-steel mixing container, and homogenized using a stainless-steel spoon or an electric drill with decontaminated stirring paddle until the sediment is of uniform color and consistency. Once homogenized, the subsamples will be placed in appropriate pre-labeled containers. The samples will be submitted for laboratory analysis following appropriate handling and COC requirements as described in the QAPP (Attachment 1 to the SAP). A complete description

of analytes, analytical methods, target detection limits, and holding requirements are also provided in the QAPP.

### **3.5 Shoreline Bank Soil Sample Collection**

Surface soil samples from the 0- to 1-foot interval will be collected from the landside for chemical testing by hand or excavator bucket, in accordance with the protocol listed below.

#### **3.5.1.1 Soil Sampling Procedure**

The sampling personnel or excavator will maneuver to the target sampling location. Using a decontaminated stainless steel shovel or an excavator with a decontaminated bucket, a pit will be dug to a minimum of 1-foot below the final excavation elevation. Using a decontaminated stainless steel shovel or spoon, soil will be collected from the sidewall of the pit between 0 and 1 feet below the final excavation elevation and placed in a decontaminated stainless-steel mixing container. Prior to sample collection, care will be taken to remove any soil from the sidewall that may have been smeared from higher elevations during excavation of the pit.

#### **3.5.1.2 Processing Procedure**

The collected soil will be placed in a decontaminated stainless-steel mixing container and homogenized using a stainless-steel spoon or an electric drill with decontaminated stirring paddle until the soil is of uniform color and consistency.

Each sample will be described and documented on standardized sample collection log. Collection logs will include the following observations, as relevant:

- Physical soil description in accordance with the Unified Soil Classification System (e.g., soil type, density, color.)
- Odor (e.g., hydrogen sulfide, petroleum)
- Presence of vegetation
- Presence of man-made debris (e.g., trash)
- Depth and distinctness of geologic contacts
- Any other distinguishing characteristics or features

Field personnel will take digital photographs of the sample pit and homogenized sample. Once homogenized, the samples will be placed in appropriate pre-labeled containers. The samples will be submitted for laboratory analysis following appropriate handling and COC requirements as described in the QAPP (Attachment 1 to the SAP). A complete description of analytes, analytical methods, target detection limits, and holding requirements are also provided in the QAPP.

### **3.6 Decontamination Procedures**

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with collected samples must meet high standards of cleanliness. All equipment that comes into contact with sampling media will be decontaminated prior to each day's use and between sampling locations. The decontamination procedure is as follows:

- Pre-wash rinse with site water
- Wash with solution of laboratory grade non-phosphate based soap
- Rinse with site water
- Rinse three times with laboratory-grade distilled water
- Store in clean, closed container or wrap in aluminum foil for next use

Additionally, the laboratory will provide pre-cleaned and labeled sample containers.

### **3.7 Sample Identification Numbers**

#### **3.7.1 Surface Water**

All surface water samples will be properly identified on their attached labels as well as on any forms or in other documentation. Station names will use the following identification scheme consisting of up to 12 alphanumeric characters (A-BBBB-C-YYMMDD):

1. The first character (A) will be used to identify the construction activity being monitored:
  - R = Removal (e.g., Dredging, debris removal, pile removal)
  - B = Backfilling

2. The next two characters (BB) will be used to identify the water quality monitoring location:
  - BG = Background Station
  - EW = Early Warning Station
  - 150C = 150-foot Compliance Station (downstream or upstream of the “construction work area”)
  - 200M = 200-foot Monitoring Station (downstream or upstream of the “construction work area”)
  - 250M = 250-foot Monitoring Station (downstream or upstream of the “construction work area”)
  - 300C = 300-foot Compliance (downstream or upstream of the “construction work area”)
3. The third character (C) will be used to identify the monitoring depth:
  - S = Surface
  - M = Middle
  - B = Bottom
4. The last six characters (YYMMDD) will be used to identify the monitoring date:
  - YY = The last two digits of the year of collection
  - MM = The month of collection
  - DD = The date of collection

For example, following this identification scheme, “R-150C-B-131018” represents a sample collected during monitoring during removal (R) at the 150-foot compliance station (150C) at the bottom depth in the water column (B) on October 18, 2013.

### **3.7.2 Soil and Sediment**

All soil and sediment samples will be properly identified on their attached labels as well as on any forms or in other documentation. All sample identification numbers will be consistent with the following identification scheme:

- The first two characters will be “JF” to identify the samples as Jorgensen Forge samples.

- The next characters will be used for station identification as identified in Table 2 of the OMMP (Appendix F of the BODR) and CQAP (Appendix D of the BODR).
- The last six characters will indicate the sample date by YYMMDD.

For example, following this identification scheme, JF-PEB-1-120518 indicates a sample collected at Jorgensen Forge at Station PEB-1 on May 18, 2012.

### **3.7.3 Sample Collection Schedule**

The schedule of sample collection events is identified in the CQAP (Appendix D to the BODR), WQMP (Appendix E to the BODR), and OMMP (Appendix F to the BODR).

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## 4 DOCUMENTATION, SAMPLE HANDLING, AND CHAIN-OF-CUSTODY

Requirements for documentation, sample handling, and COC procedures related to sample collection events are outlined in this section.

### 4.1 Documentation

Field activities and samples must be properly documented during the sample collection process. Documentation of field activities provides an accurate and comprehensive record of the work performed sufficient for a technical peer to reconstruct the day's activities and provide certification that all necessary requirements were met. General requirements include:

- Use of a Field Activity Log to formally document activities and events. The Field Activity Log can be a standard or project-specific form or a bound field book. Pre-printed standard forms are available for many activities and should be used whenever possible. These forms provide prompts and request additional information that may be useful and/or needed. Project-specific field forms may be generated or existing forms may be modified to meet specific project needs. As required, client-supplied forms may be substituted.
- Appropriate header information documented on each page, including project title, project number, date, weather conditions, changes in weather conditions, other persons (if any) in the field party, and author. The specific information requested depends on the nature of the work being performed and on the form being used. Information fields that are not applicable should be noted "N/A" or with other appropriate notations.
- Field documentation entries using indelible ink.
- Legible data entries. A single line should be drawn through incorrect entries and the corrected entry should be written next to the original strikeout. Strikeouts are to be initialed and dated by the originator.
- Applicable units of measurement with entry values.
- Field records maintained in project files unless otherwise specified by a client or stipulated by a contract.

#### **4.1.1 Documentation Entries**

A chronology of field events will be recorded. General entry requirements include:

- Visitors to the removal action area, including EMJ, Jorgensen Forge, and regulatory agency representatives
- Summary of pertinent project communications with the client, regulators, or other removal action area visitors
- Other contractors working at the removal action area
- A description of the day's field activities, in chronological sequence using military time notation (e.g., 9:00 am: 0900 and 5:00 pm: 1700)
- If applicable, calibration of measuring and test equipment and identification of the calibration standard(s) and use of a Calibration Log, if available, with cross-reference entered into the field book
- Field equipment identification, including type, manufacturer, model number, or other specific information
- General weather conditions, including temperature, wind speed, and direction readings, such as time of measurement and units
- Safety and/or monitoring equipment readings, including time of measurements and units
- If applicable, reference in the field notebook to specific forms used for collection of data
- Subcontractor progress and/or problems encountered
- Changes in the scope of work
- Other unusual events

#### **4.1.2 Specific Requirements**

##### **4.1.2.1 Sample Collection**

Sample collection data will be documented in a bound field book and/or on a sample collection form. Where both are being used, information contained in one is cross-referenced to the other. Entries may include:

- Sample identification number, location taken, depth interval, sample media, sample preservative, collection time, and date
- Sample collection method and protocol

- Physical description of the sample (according to the Unified Soil Classification System)
- QC-related samples collected (e.g., duplicates, blinds, trip blanks, field blanks)
- Container description and sample volume
- Pertinent technical data, such as sample penetration depth and sampling interval
- Pertinent technical comments
- Identification of personnel collecting the sample

#### *4.1.2.2 Sample Labeling*

Sample labels must be prepared and attached to sample containers. Labels will either be provided by the laboratory performing the analyses or will be generated internally. The information to be provided includes:

- Sample identification number
- Sample date and collection time
- Physical description of the sample (e.g., water, solid, gas)
- Analytical parameters
- Preservatives, if present
- Sampling location
- Client

#### *4.1.2.3 Visual Monitoring Documentation*

Color photographs of a reasonable quality and quantity will be taken to document any evidence of sloughing or instability in the backfill material or reconfigured shoreline. A visual observation log will be completed in the field by the monitoring crew (Attachment 2). Any areas of sloughing or instability will also be marked on a site map (Attachment 3).

#### *4.1.2.4 Surface Water Collection*

Specific surface water sample collection documentation procedures are described in detail in the WQMP (Appendix E to the BODR) and are not included in this FSP.

#### **4.1.2.5      *Sediment and Soil Collection***

The field logbook will include clear information concerning sediment and soil collection activities. Sediment Core Collection Log and Visual Observation Log (Attachments 1 and 2) will be completed for each sediment and soil grab or core. In addition to standard entries of personnel, date, and time, the log will also include information regarding station coordinates, penetration of the sampler, sample recovery length and percentage, and physical characteristics of the sediment (such as texture, color, odor, stratification, and sheens).

### **4.2      *Sample Handling Procedures***

Sample handling procedures include correctly labeling and packing all sample containers prior to transport for laboratory testing. Sample containers will be obtained from the analytical laboratory. Each container will be labeled appropriately with all relevant information as detailed in Section 4.1.2.2.

Samples will be stored and shipped in a properly packed container at 4 degrees Celsius (°C). All samples will be delivered to the laboratory within 48 hours of the time of collection, with the possible exception of some samples collected on Friday or Saturday. In those cases, the samples will be stored at 4°C and shipped at the earliest allowable time.

### **4.3      *Chain-of-Custody Procedures***

An important component of data collection is the ability to demonstrate that samples were obtained from the stated locations and that they reached the laboratory or archive location without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal or archive must be properly documented. Documentation will be accomplished through a COC form that documents each sample and identifies the individuals responsible for sample collection, shipment, and receipt. A sample is considered in one's custody if at least one of the following criteria is met:

- The sample is in a person's actual possession.
- The sample is in unobstructed view, after being in the person's actual possession.
- The sample is locked and only accessible by the custodian after having been in the person's actual possession.
- The sample is in a secured area, restricted to authorized personnel (e.g., laboratory).

A laboratory typically will not accept samples for analysis without a correctly prepared COC form. The COC form must be signed by each individual who has the sample in his/her custody. A COC form is to be prepared for each sample shipped to a laboratory for analysis. Information on this form correlates with other supporting documentation, including sample labels and sample collection logs.

The COC form accounts for the elapsed time and custodians of the sample from the time of its collection. The individuals who have physically handled the sample or witnessed initial sample collection and packaging (e.g., a sample team member) must be identified on the form. A sample team member relinquishes the sample by signing the COC form. Individuals who either relinquish or receive samples must include their complete names, company affiliation, and the date and time the samples were relinquished and received. The times that the samples are relinquished and received by the next custodian should coincide, with the exception of transfer by commercial carriers. Commercial carriers will not be required to sign the COC.

If a sample is to be stored for a period of time (e.g., overnight), measures are to be taken to secure the sample container in a manner that provides only the custodian of record with access. If samples are relinquished to a commercial carrier (e.g., UPS, Federal Express), the carrier waybill number will be recorded and a copy of the waybill will be attached to the COC form. These documents are maintained with other field documentation. The original COC will be sealed inside the shipping container with the samples.

If a correction is made to the COC, the correction should be made by the originator of the change, who will draw a single line through the error, initial and date the correction, and, if necessary, provide an explanation of the change. The documentation should have sufficient detail to clearly document the change to a third-party reviewer.

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## **5 QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS**

All analyses described in this FSP will be conducted in accordance with the standard QA/QC procedures described in the QAPP (Attachment 1 of the SAP). Analytical instruments will be maintained and calibrated regularly. Log books will be maintained for major field and laboratory instrumentation to document servicing, maintenance, and instrument modification.

### **5.1 Analytical Chemistry**

Quality procedures are described for each analytical method in the QAPP (Attachment 1 of the SAP). The type and frequency of QA/QC samples analyzed by the laboratory will be according to the specified analytical method. Necessary corrective actions will be taken to address problems, according to the guidelines for a particular method. All corrective actions will be reported, along with any deviations from the standard protocols.

Results of all laboratory QA/QC analyses and anything that might affect the integrity of the results will be reported. Any deviations from the standard testing guidelines, QA/QC limits, and acceptability criteria will be reported, including a discussion of their effect on data validity. All datasheets will be checked to ensure that test conditions are within the protocol specifications, and project data will be reviewed to determine their usability for making suitability determinations.

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## 6 WASTE MANAGEMENT

Procedures that will be used to properly dispose of field-generated waste from the field work associated with sediment samples. Waste disposal will fall into two categories:

- Sediment spilled on the vessel deck during surface sample collection and sediment from rejected grab or core samples will be washed into the surface water at the collection site.
- Waste in the category of disposable sampling materials and PPE will be placed in heavy-weight garbage bags or other appropriate containers.

All disposable sampling materials and PPE used in sample processing (such as disposable coveralls, gloves, and tubing) will be placed in heavyweight garbage bags or other appropriate containers. Disposable materials will be placed in an on-site refuse container for disposal at a solid waste landfill.

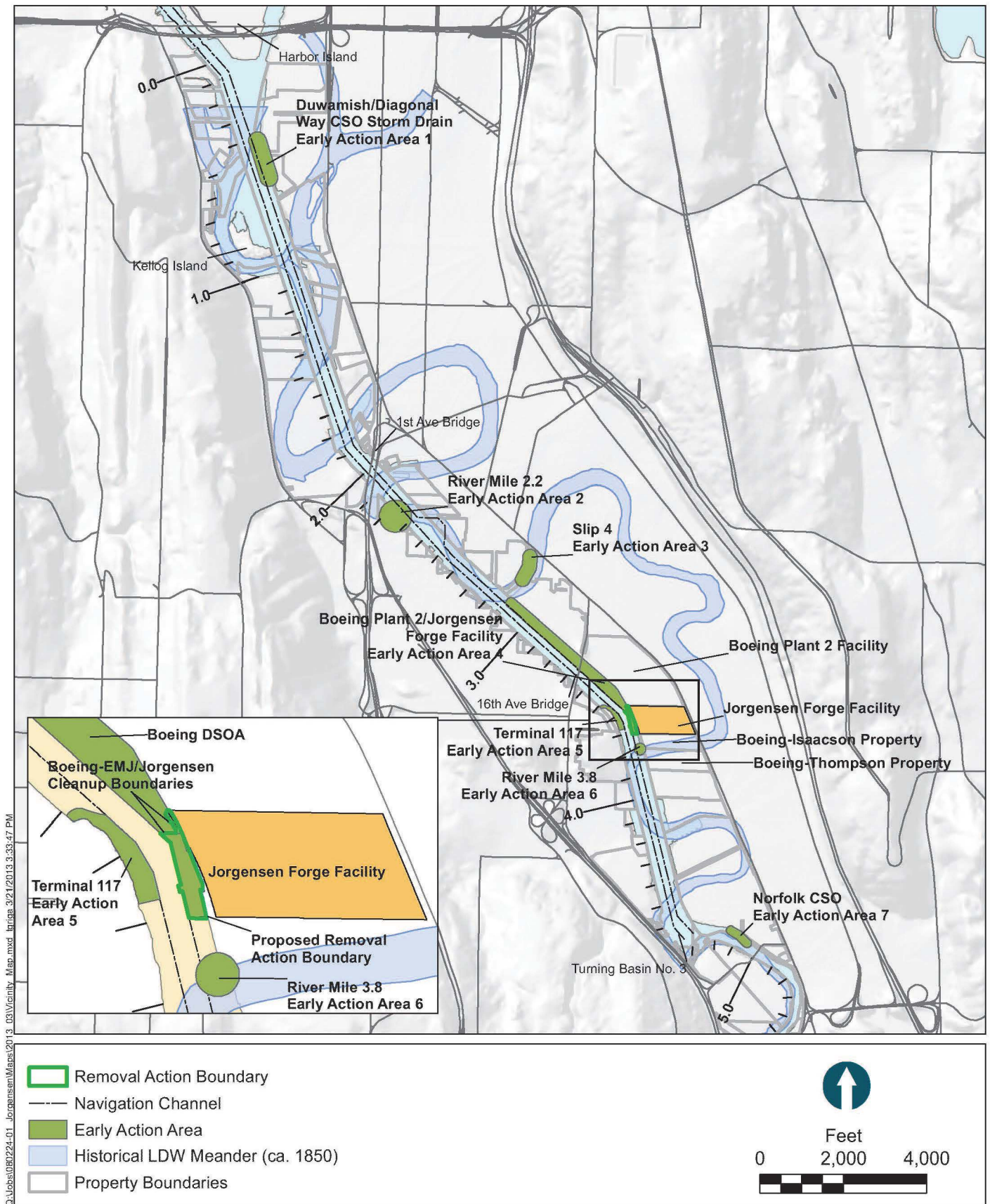
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## 7 REFERENCES

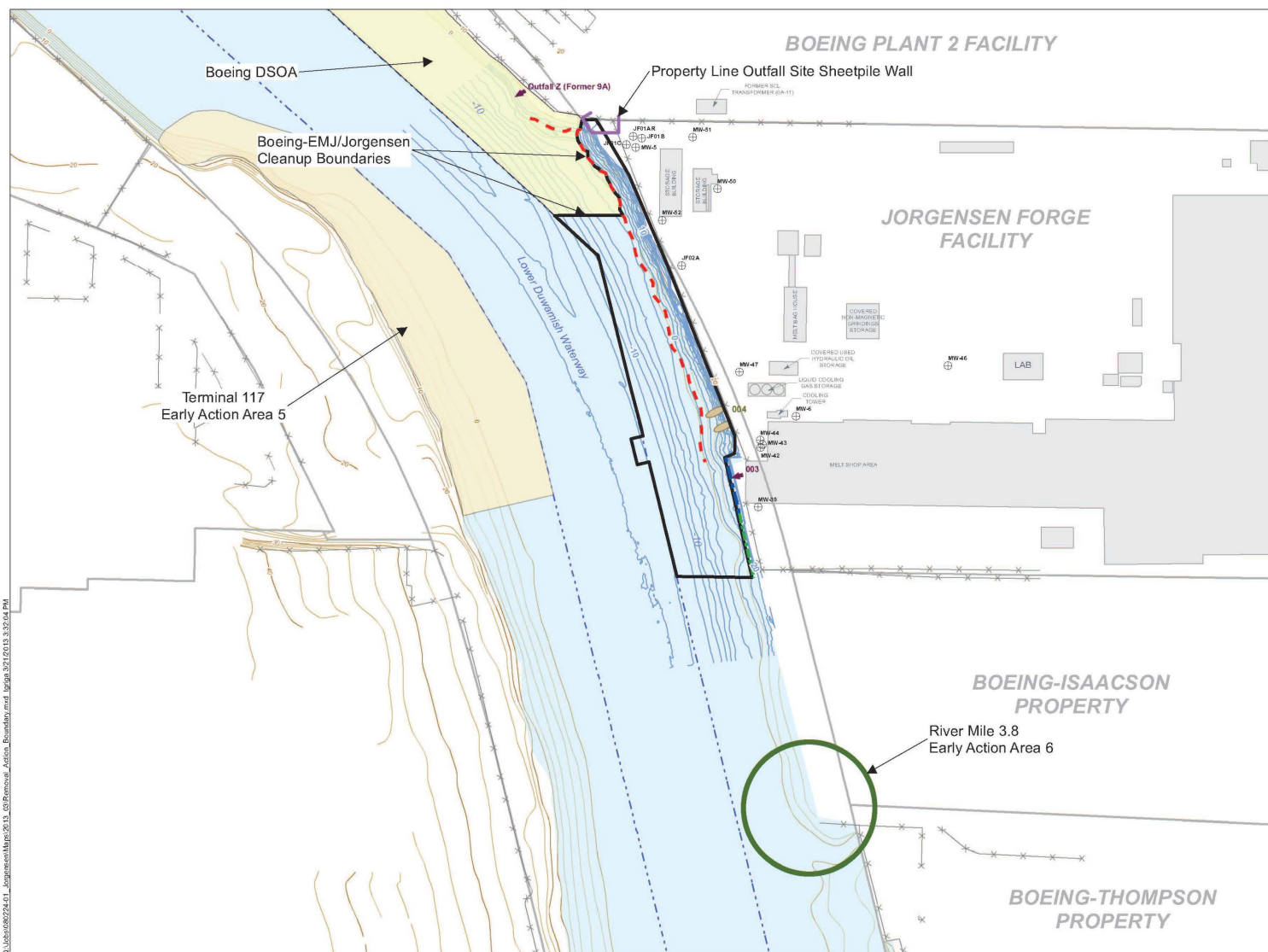
- Anchor QEA, 2011. *Final Engineering Evaluation/Cost Analysis – Jorgensen Forge Facility, 8531 East Marginal Way South, Seattle, Washington*. Prepared for the U.S. Environmental Protection Agency. March 2011.
- EMJ (Earle M. Jorgensen), Jorgensen Forge Corporation, and The Boeing Company, 2007. *Memorandum of Understanding: Coordination at the Boeing and EMJ/Jorgensen Transition Zone Boundary Sediment Cleanup Areas; Lower Duwamish Waterway (MOU)*. September 2007.
- EPA (U.S. Environmental Protection Agency), 2008. Letter with Subject: Target Remedial Sediment Boundary, Vertical Point of Compliance and Target Sediment Cleanup Level, Administrative Order on Consent, Jorgensen Forge Facility, Tukwila, Washington, Comprehensive Environmental Response, Compensation and Liability Act, as amended, EPA Docket No. CERCLA 10-2003-0111. Prepared for Mr. Peter Jewett of Farallon Consulting, LLC, and Mr. William Johnson of Earle M. Jorgensen Company. August 8, 2008.
- EPA, 2011. *Action Memorandum for a Non-Time-Critical Removal Action at the Jorgensen Forge Early Action Area of the Lower Duwamish Waterway Superfund Site in Seattle, Washington*. Seattle, Washington.

## FIGURES

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**Figure 1**  
Removal Action Vicinity Map  
Field Sampling Plan  
Jorgensen Forge Early Action Area

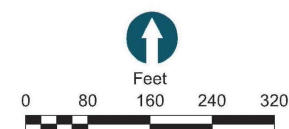


#### LEGEND

- ⊕ Groundwater Monitoring Well
- ➔ Active Outfall
- - - Toe of Existing Riprap
- - - Existing Sheetpile Wall
- - - Existing Concrete Panel Wall
- ✕ Fences
- - - Federal Navigation Channel
- ▭ Removal Action Boundary
- Debris Pile
- ▭ Property Boundaries
- Boeing DSOA
- Terminal 117 Early Action Area 5 Boundary
- Property Line Outfall Site Sheetpile Wall

#### NOTES:

1. Bathymetric survey by eTrac dated February 8, 2012. Additional back survey by AEC Consultants, Inc. dated February 21, 2012. Bathymetric and bank survey merged with upland survey by PLS, Inc. dated January 24, 2012.
2. Outfall locations field identified on May 14, 2003.
3. The toe of riprap slope was surveyed during a low tide on August 28, 2008.
4. The Boeing-EMJ/Jorgensen cleanup boundaries is identified in the Memorandum of Understanding between Boeing and EMJ/Jorgensen Forge, dated August 2007 (EMJ et al. 2007).



# ATTACHMENT 1

## SEDIMENT CORE COLLECTION LOG

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